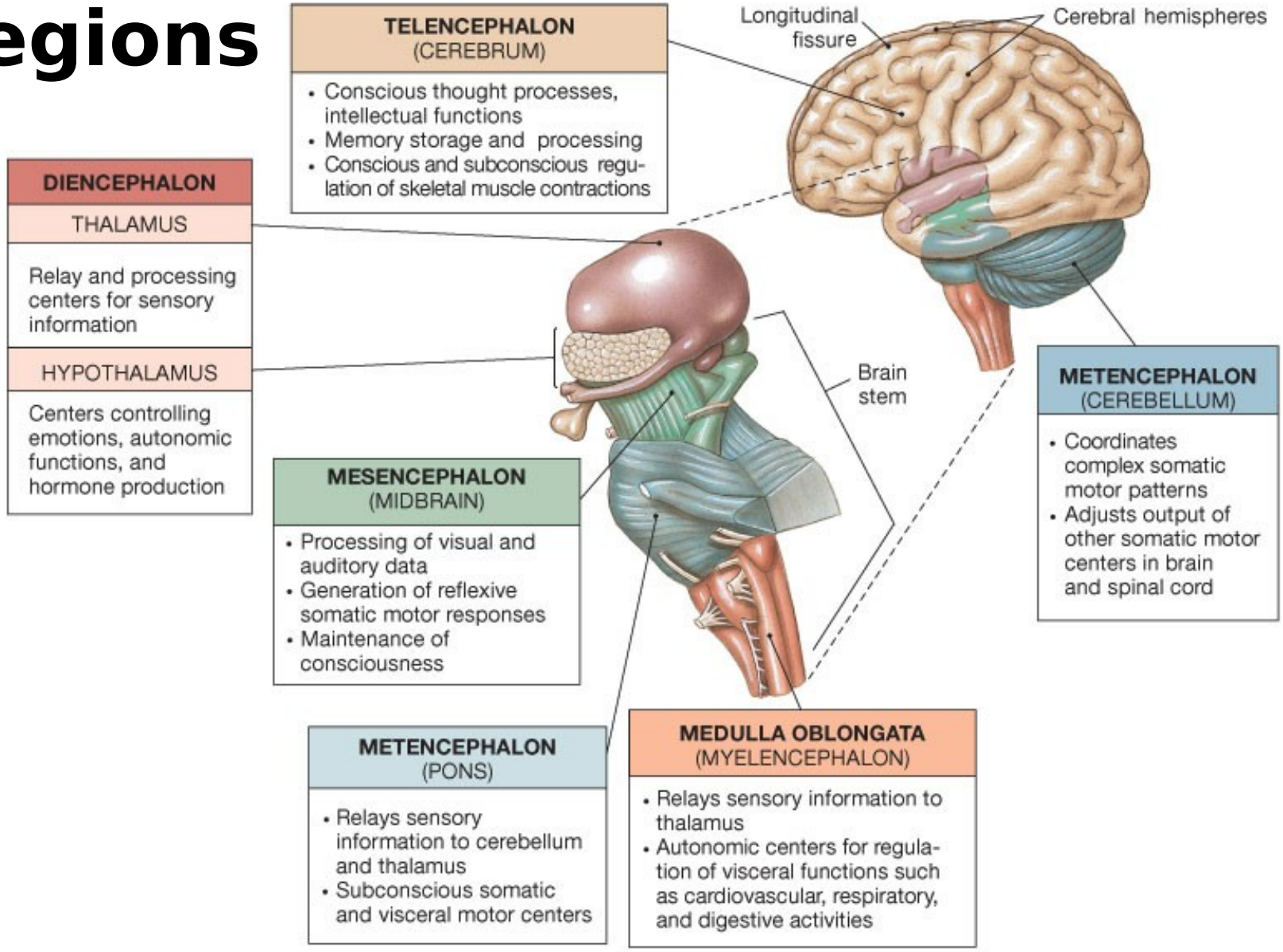
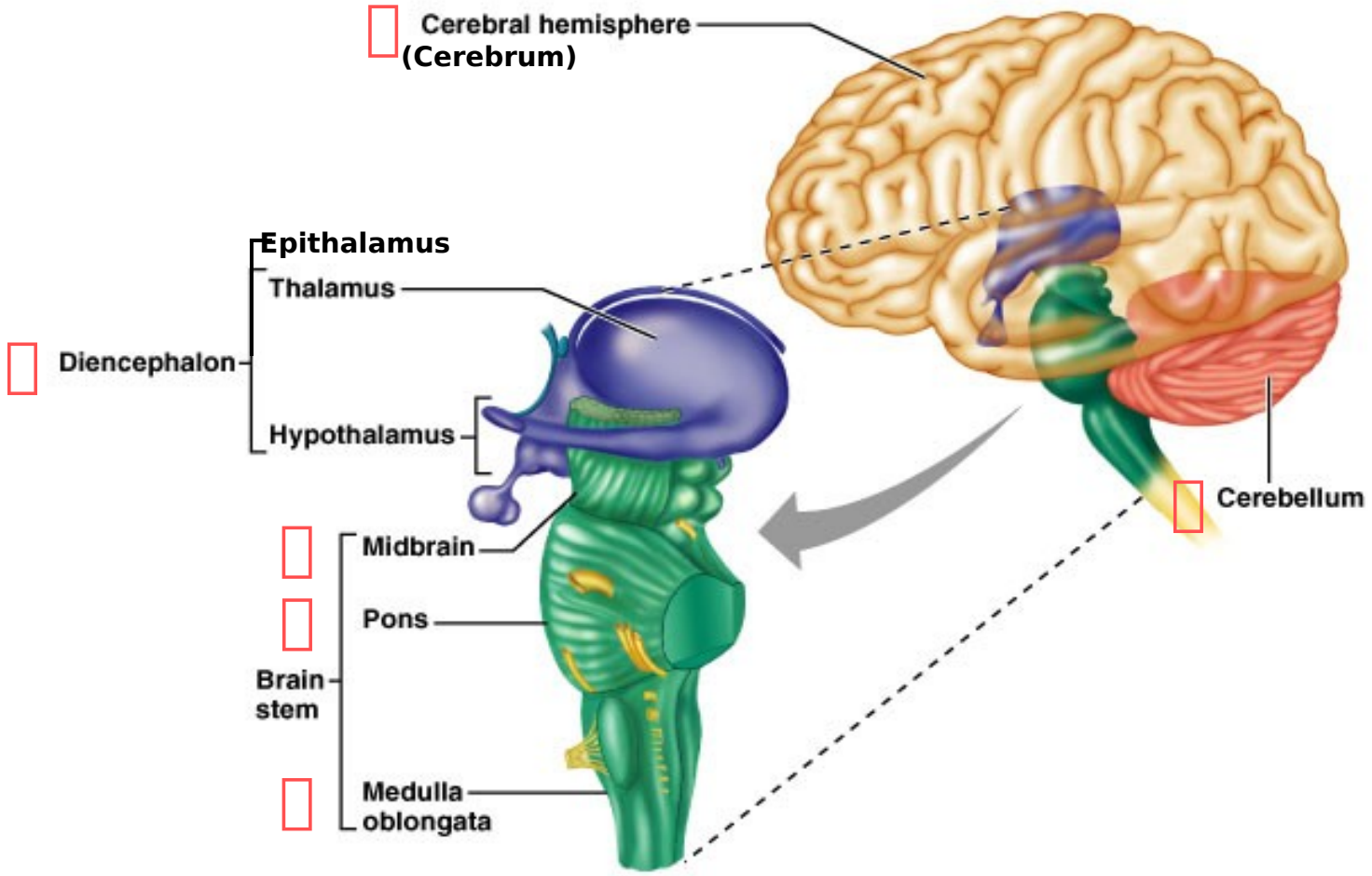
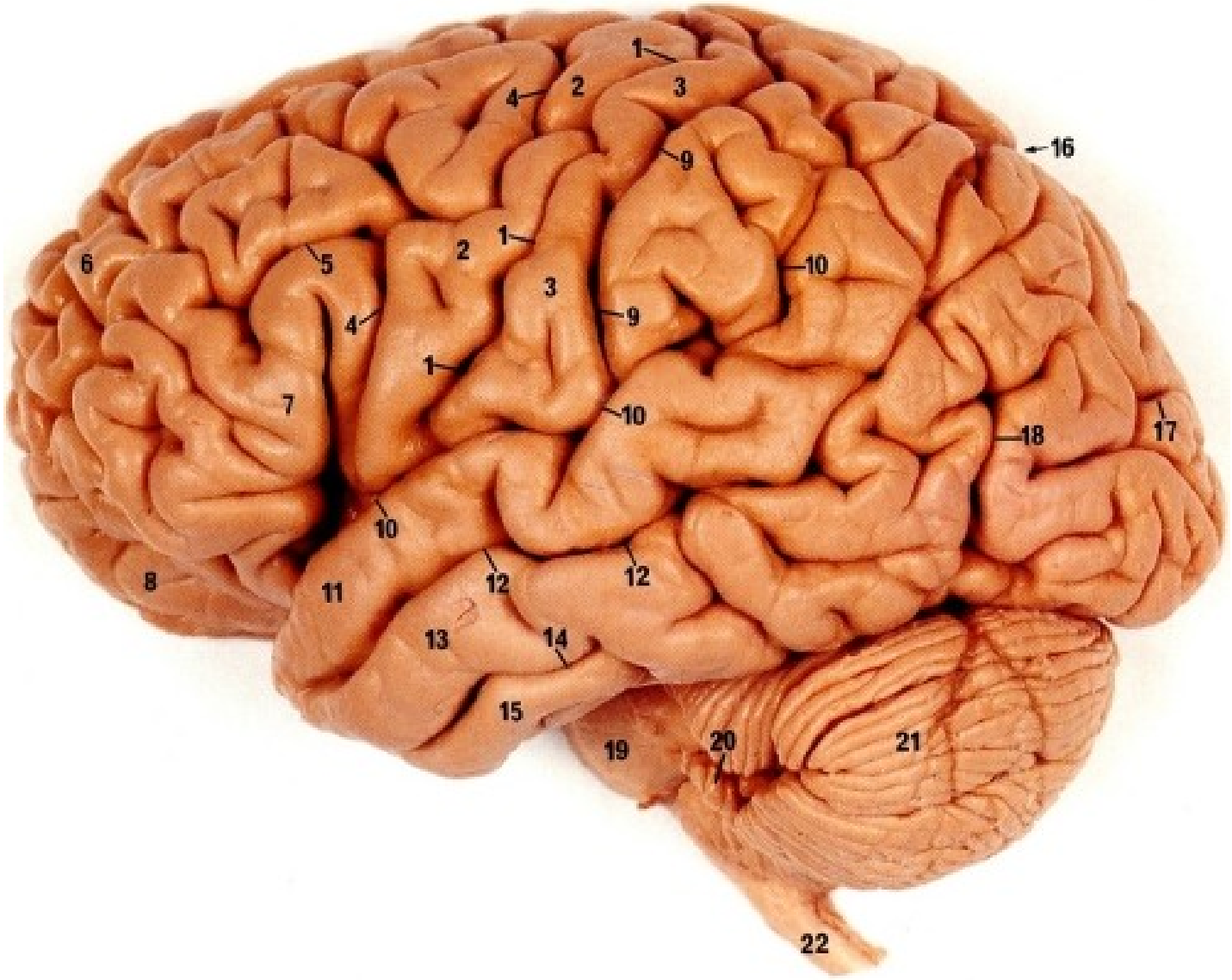
he Brain and
ts Regions


TELENCEPHALON
(CEREBRUM)
• Conscious thought processes, intellectual functions
• Memory storage and processing
• Conscious and subconscious regulation of skeletal muscle contractions
Longitudinal fissure
Cerebral hemispheres
DIENCEPHALON
THALAMUS
Relay and processing centers for sensory information
HYPOTHALAMUS
Centers controlling emotions, autonomic functions, and hormone production
Brain stem
METENCEPHALON
(CEREBELLUM)
• Coordinates complex somatic motor patterns
• Adjusts output of other somatic motor centers in brain and spinal cord
MESENCEPHALON
(MIDBRAIN)
• Processing of visual and auditory data
• Generation of reflexive somatic motor responses
• Maintenance of consciousness
METENCEPHALON
(PONS)
• Relays sensory information to cerebellum and thalamus
• Subconscious somatic and visceral motor centers
MEDULLA OBLONGATA
(MYELENCEPHALON)
• Relays sensory information to thalamus
• Autonomic centers for regulation of visceral functions such as cardiovascular, respiratory, and digestive activities

The 6 Divisions of the Brain



Surface Structures of the Brain



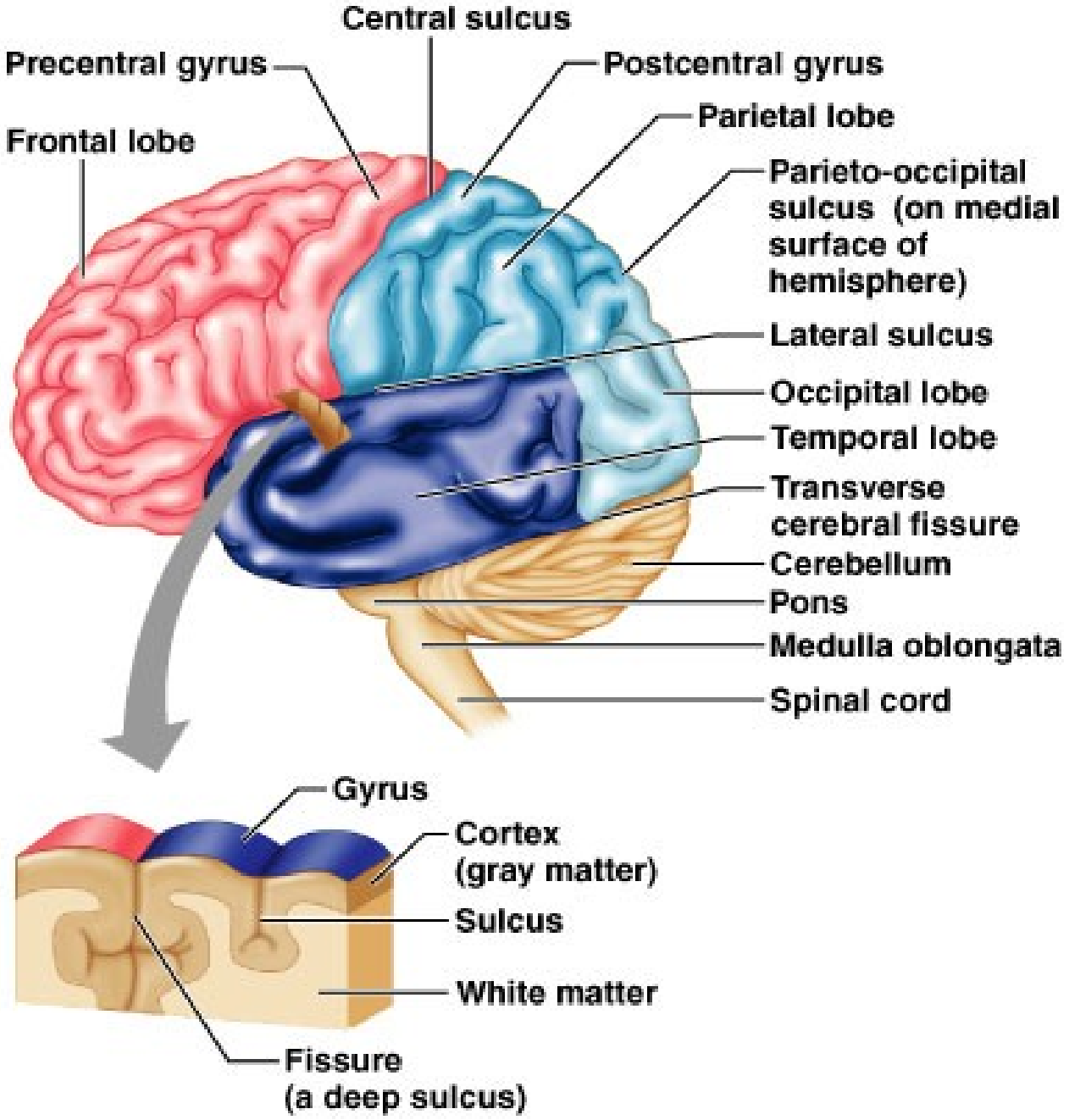
- **Sulci** (sulcus) – grooves on surface of cerebrum.
- **Gyri** (gyrus) – fold of brain tissue between sulci.
- **Fissure** - deep groove, separating hemispheres.

Three kinds of **cerebral** functional area:

1) Sensory areas

2) Association areas

3) Motor areas

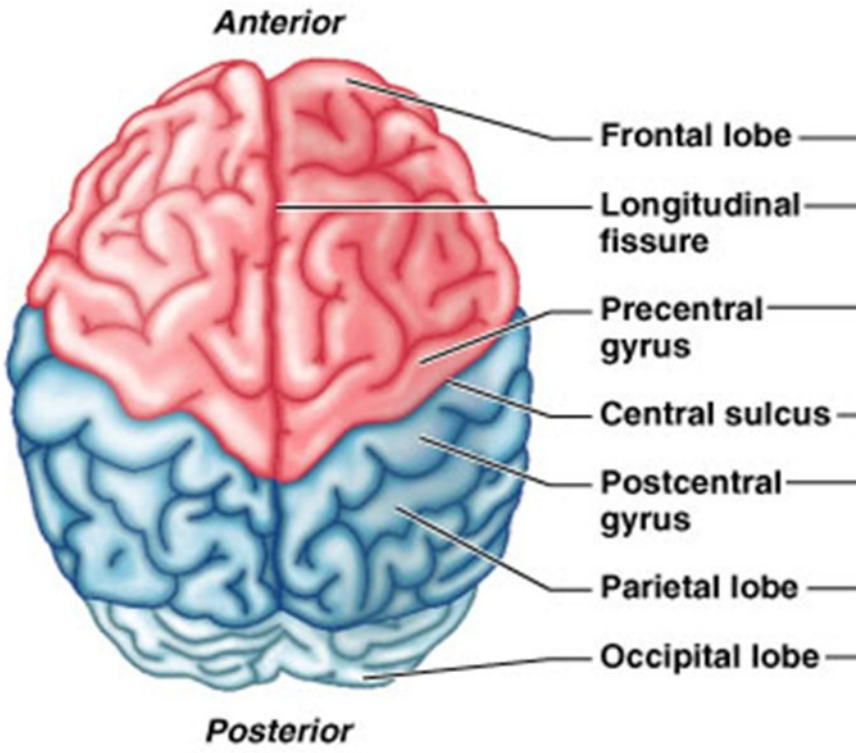

Central sulcus
Precentral gyrus
Postcentral gyrus
Frontal lobe
Parietal lobe
Parieto-occipital sulcus (on medial surface of hemisphere)
Lateral sulcus
Occipital lobe
Temporal lobe
Transverse cerebral fissure
Cerebellum
Pons
Medulla oblongata
Spinal cord
Gyrus
Cortex (gray matter)
Sulcus
White matter
Fissure (a deep sulcus)

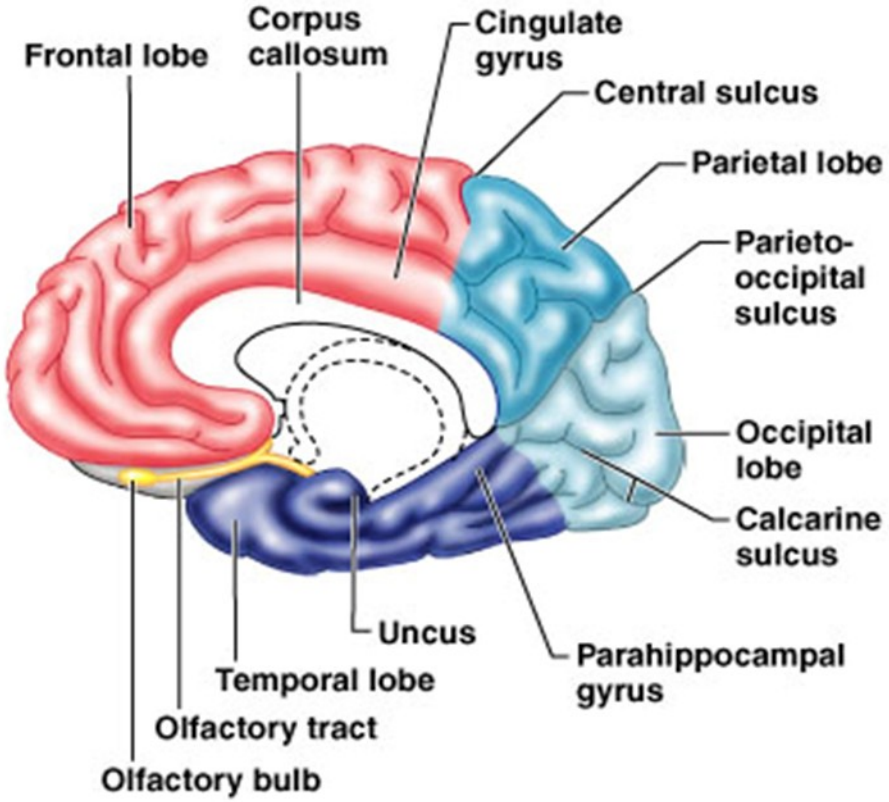
General Anatomy of Cerebrum

Two Hemispheres - Left and Right.

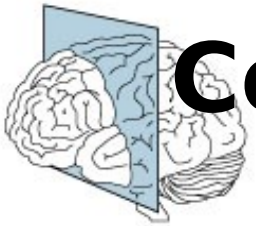
Two significant gyri: Precentral gyrus (motor).

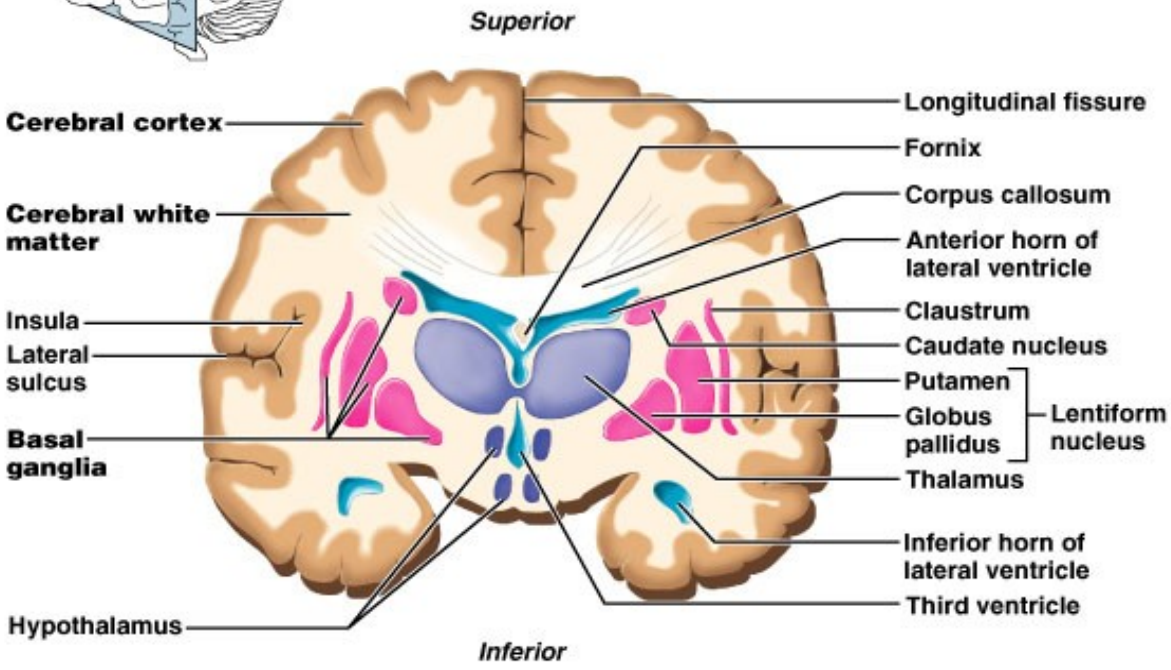
Postcentral gyrus (sensory).

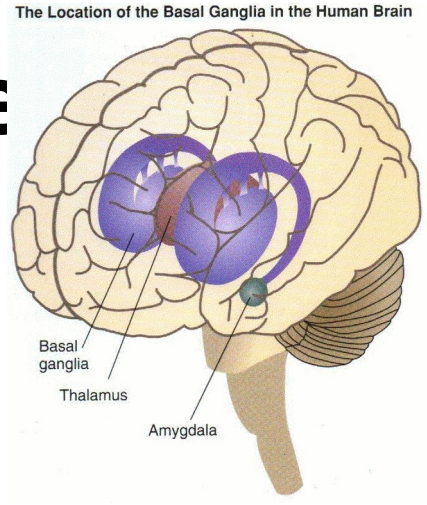




Cerebral (Basal) Nucle







Consists of 5 pairs of Nuclei

1. Caudate nucleus
2. Putamen
3. Globus pallidus
4. Subthalamic nucleus
5. Substantia nigra

The **cerebral** (basal) **nuclei** are groups of subcortical nerve cell bodies (nuclei) deep within white matter of the brain.

Role: Primarily to fine-tune voluntary body movements.
Process and signals from cerebral cortex (for movement), then convey instructions to thalamus, which then relays this back to cortex, and finally sends to skeletal muscles via the tracts of the pyramidal motor system. Other higher cortical functions also mediated via the basal ganglia,

Functions of the Cerebrum

In General - our conscious mind, enables us to:

- Be aware of ourselves and sensations.
- Initiate and control voluntary movements.
- Communicate, remember, predict and understand.

Cerebrum has 5 Lobes

ontal Lobe - memory, behavior, personality, move

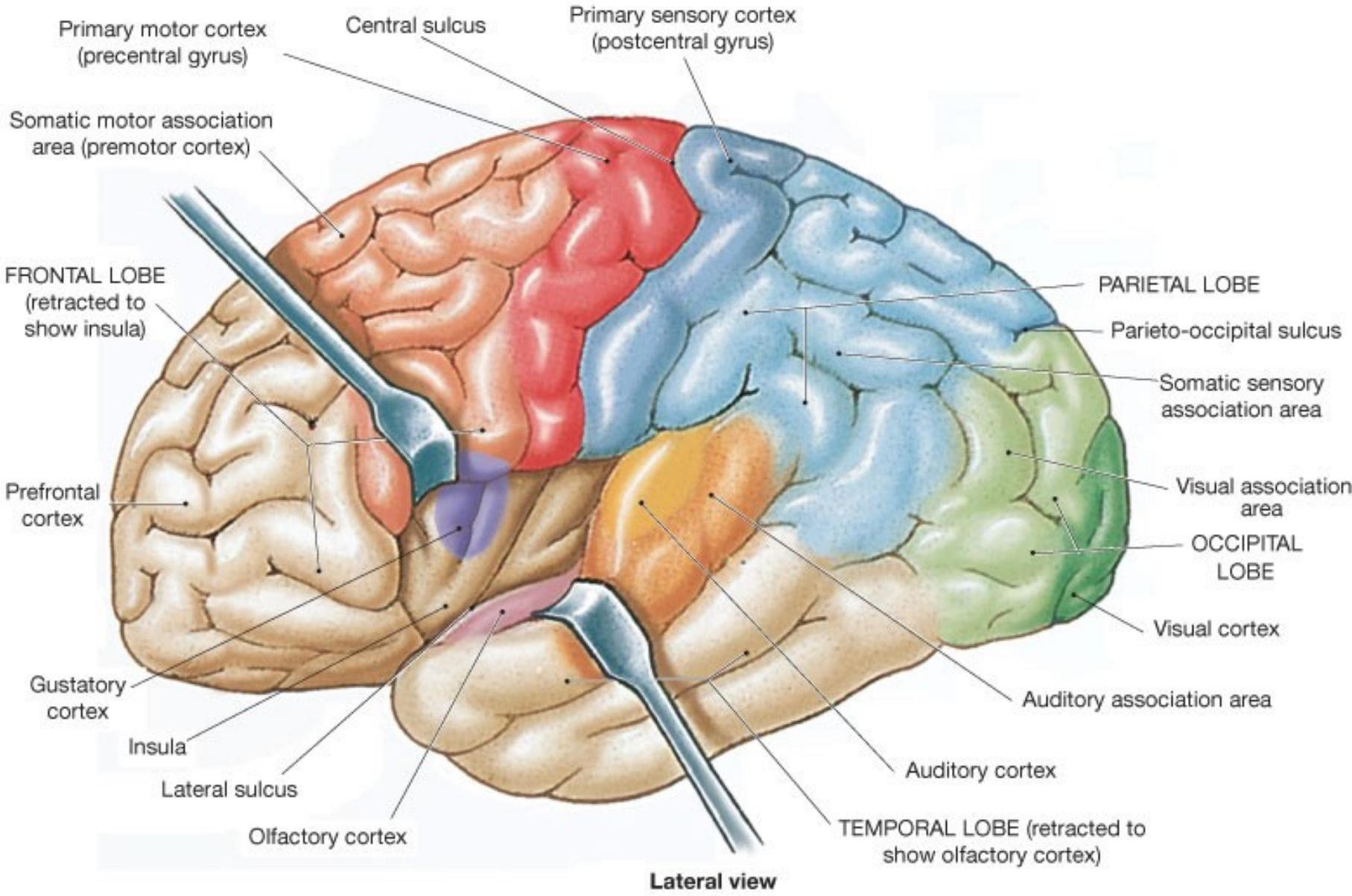
Parietal Lobe - somatic sensory perception.

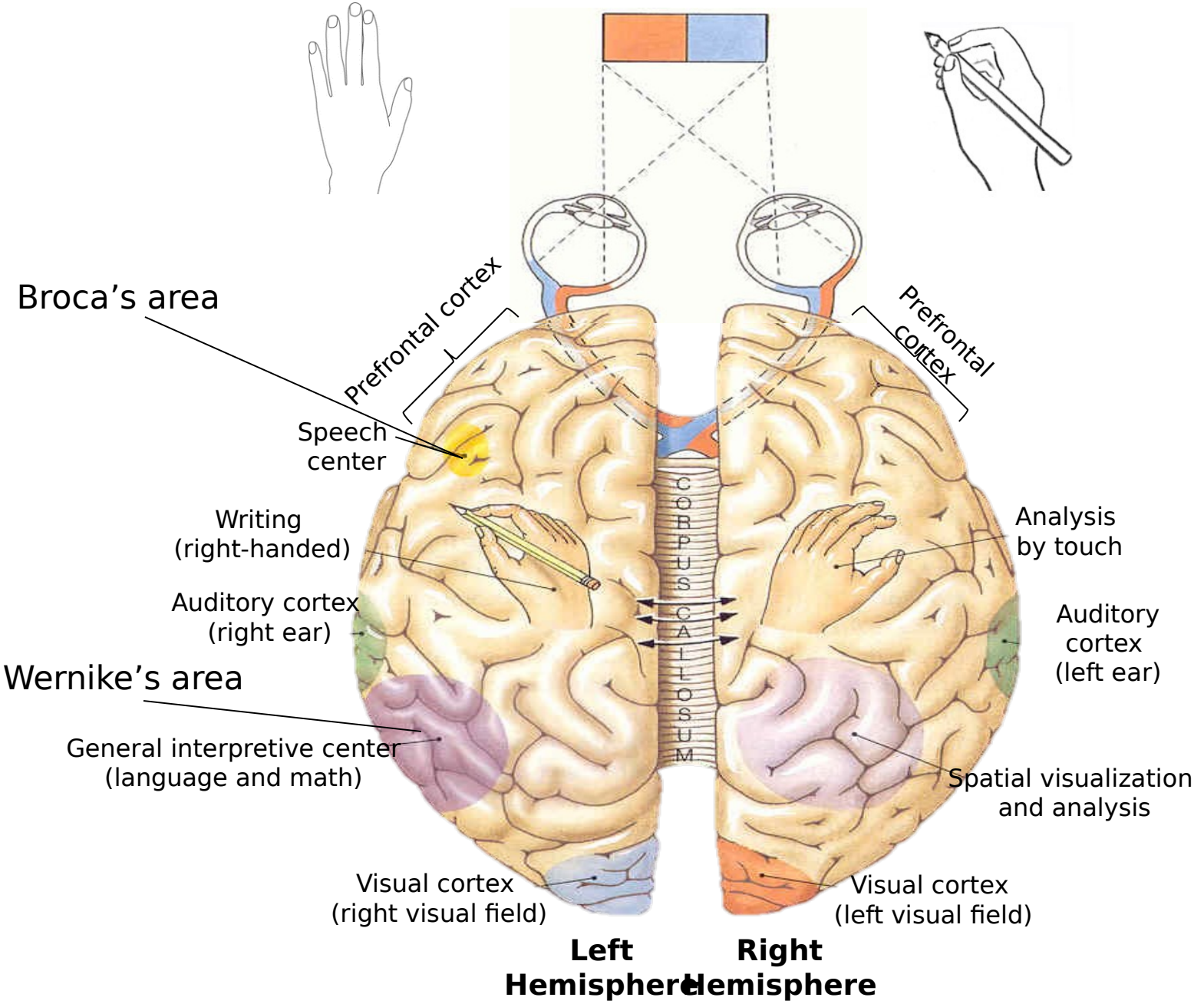
emporal Lobe - auditory and olfactory perception.

Occipital Lobe - visual perception.

nsula Lobe - visceral perception, gustatory cortex*

Cerebral Lobes

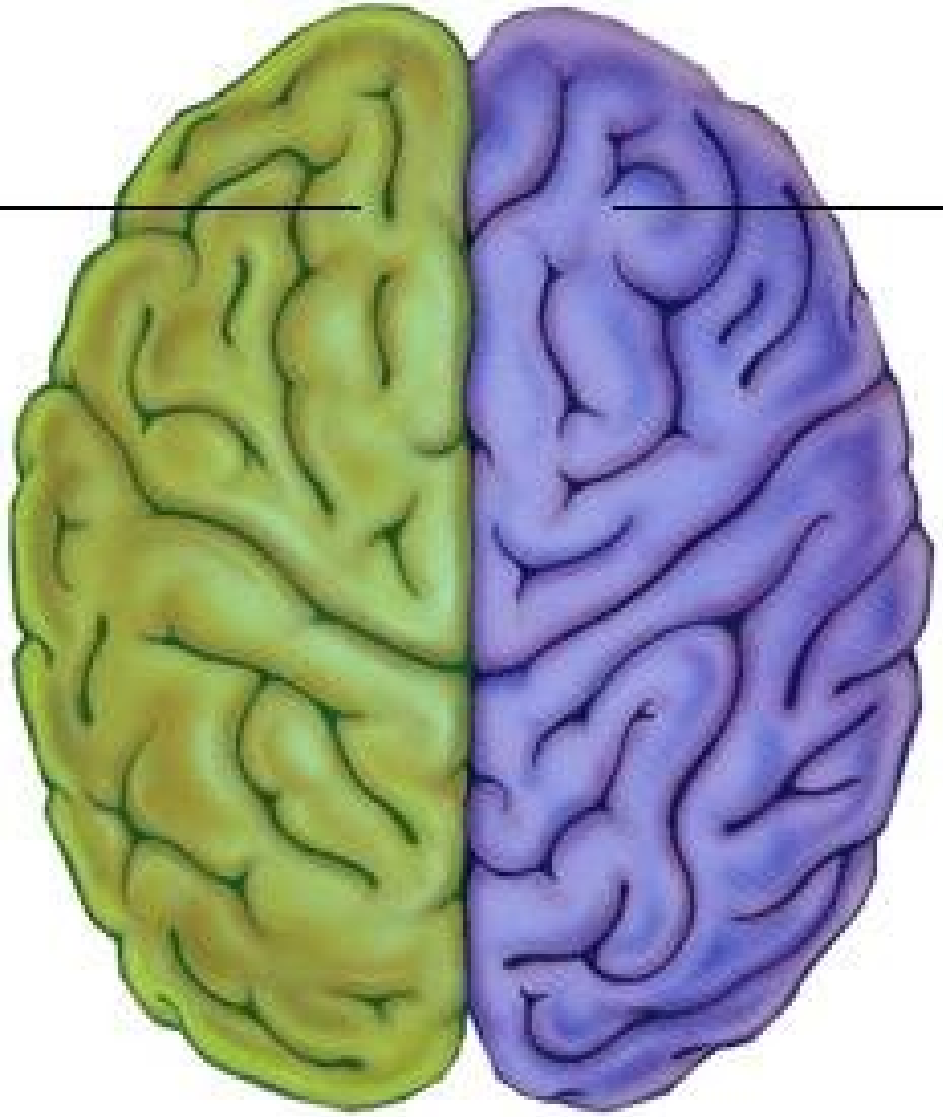




Decussation: A crossing of nerve fibers from one side of the CNS to the other

L

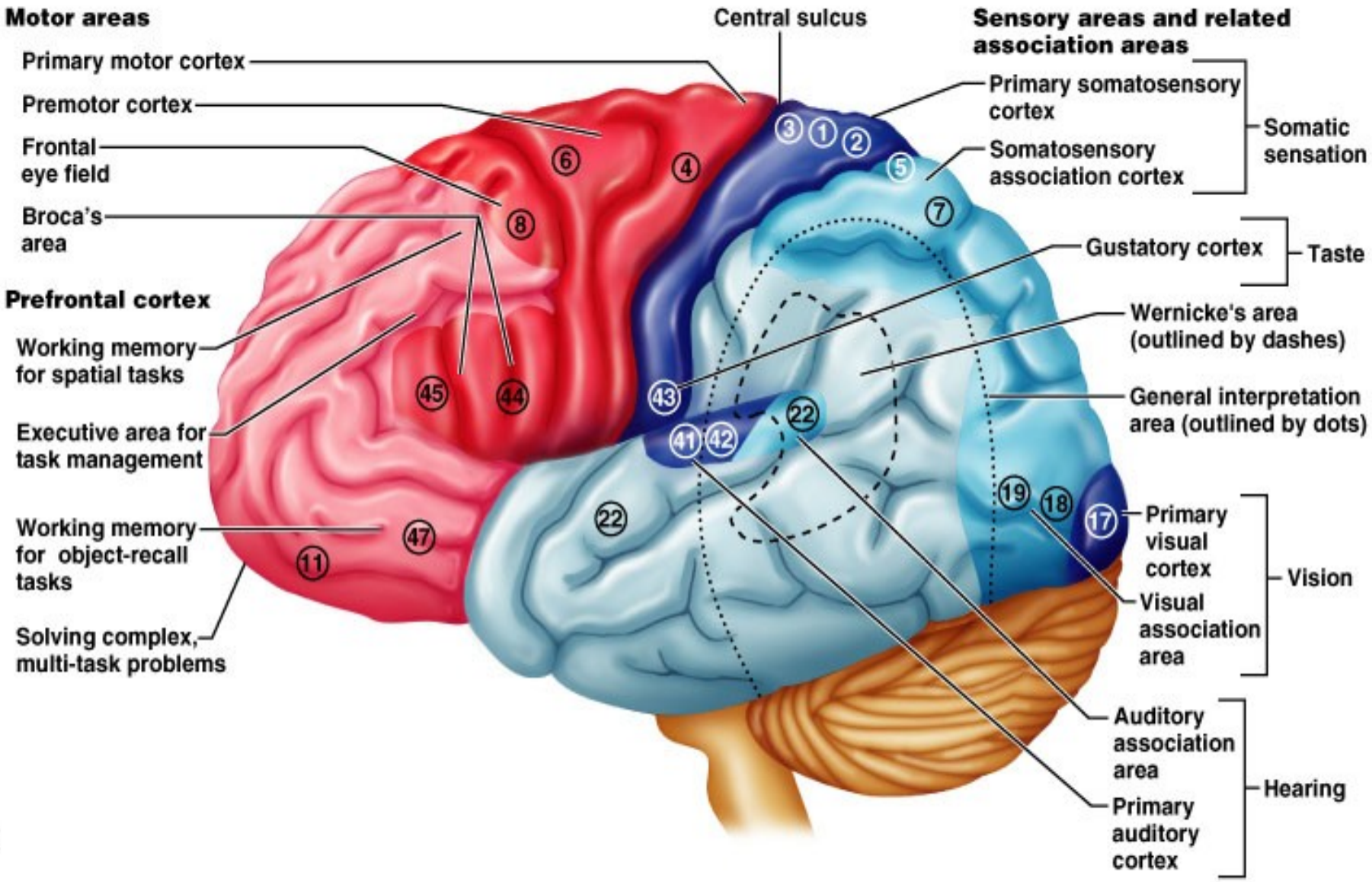
Analytical
Precise
Logical
Repetitive
Organized
Details
Scientific
Detached
Literal
Sequential



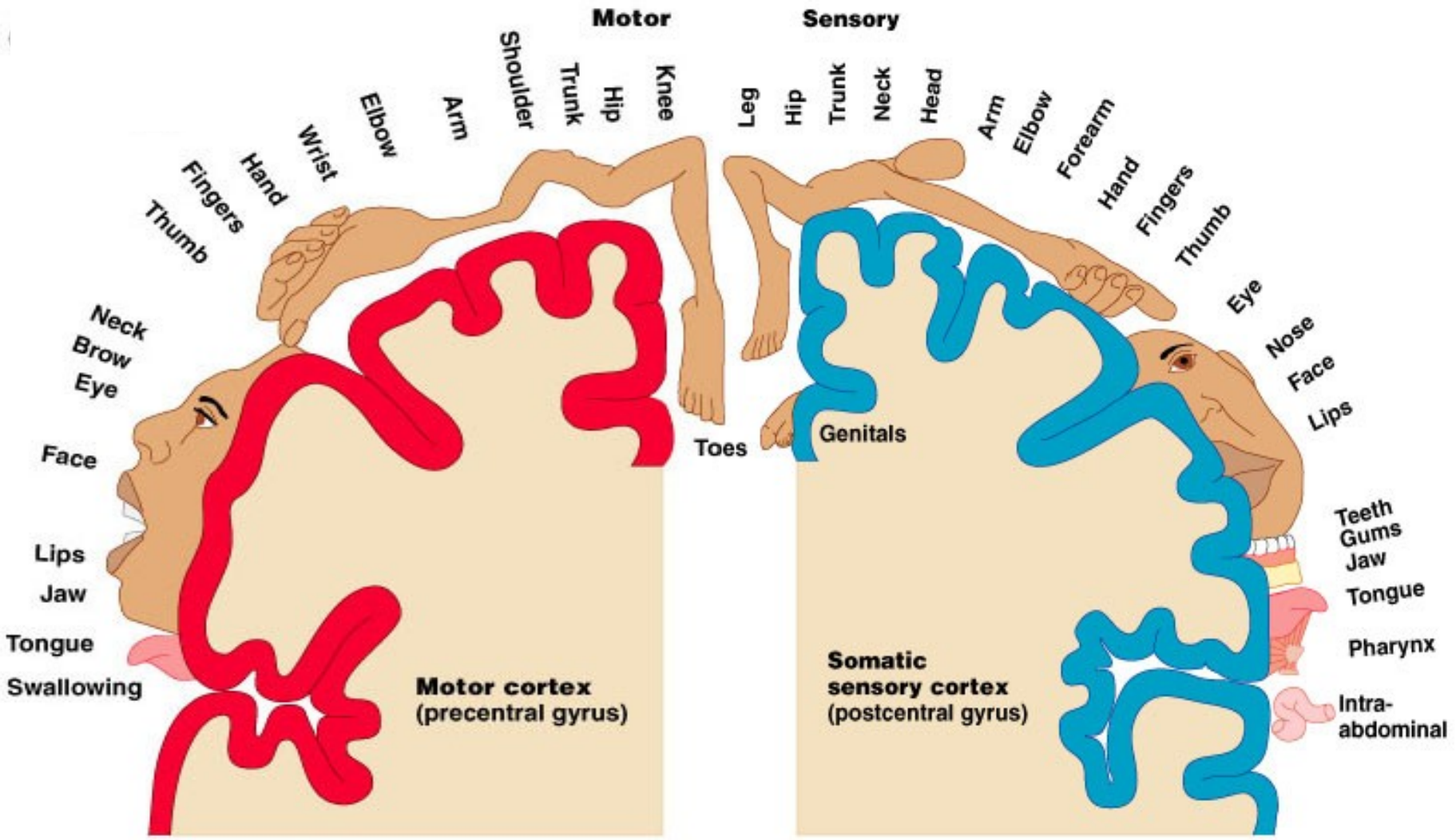
R

Creative
General
Imaginative
Intuitive
Conceptual
Holistic
Heuristic
Empathetic
Figurative
Irregular

Functional Regions of the Brain



Homunculus – Motor and Sensory



The Limbic System = "Emotional Brain"

- Anatomical Location:
  - Medial aspect of cerebral hemispheres.
  - Also within the diencephalon.
- Composed of:
  - Septal nuclei, cingulate gyrus, hippocampus and amygdala.
- The **fornix** links the limbic system together.

Structures of the Limbic System

Cingulate gyrus

Allows us to shift between thoughts.

Interprets pain as unpleasant.

Amygdala

Detects menacing glances from others.

Emotional recognition of faces.

Hippocampus

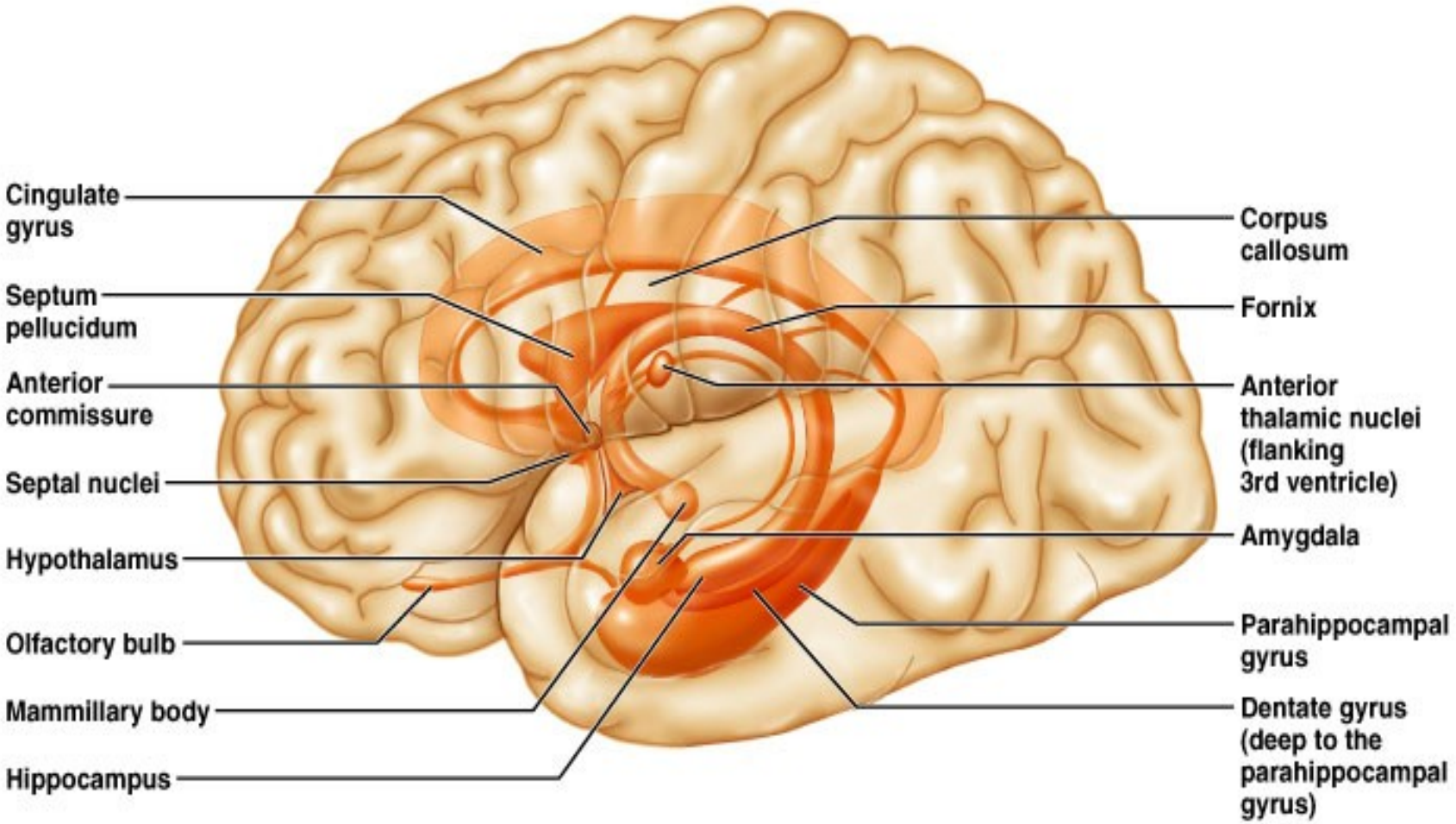
Consolidation of new memories (storage & retrieving)

Navigation and Spatial Orientation.

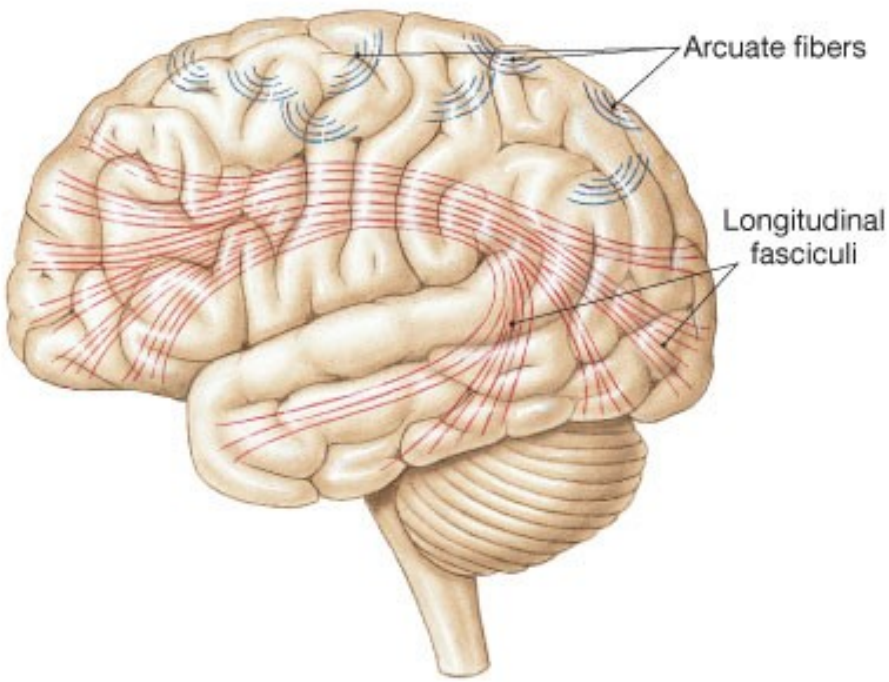
Septal Nuclei

Role in reward and reinforcement.

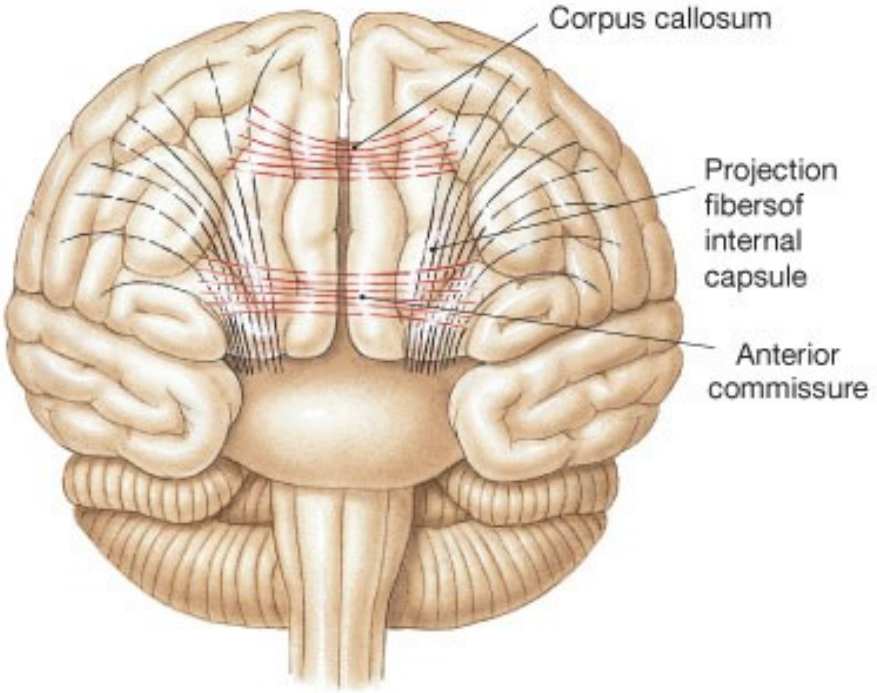
tomical Structures of the Limbic Sys



The major groups of axon fibers and tracts of the central white matter.



(a) Lateral view



(b) Anterior view

a) Association Fibers

b) Commissural Fibers

c) Projection Fibers

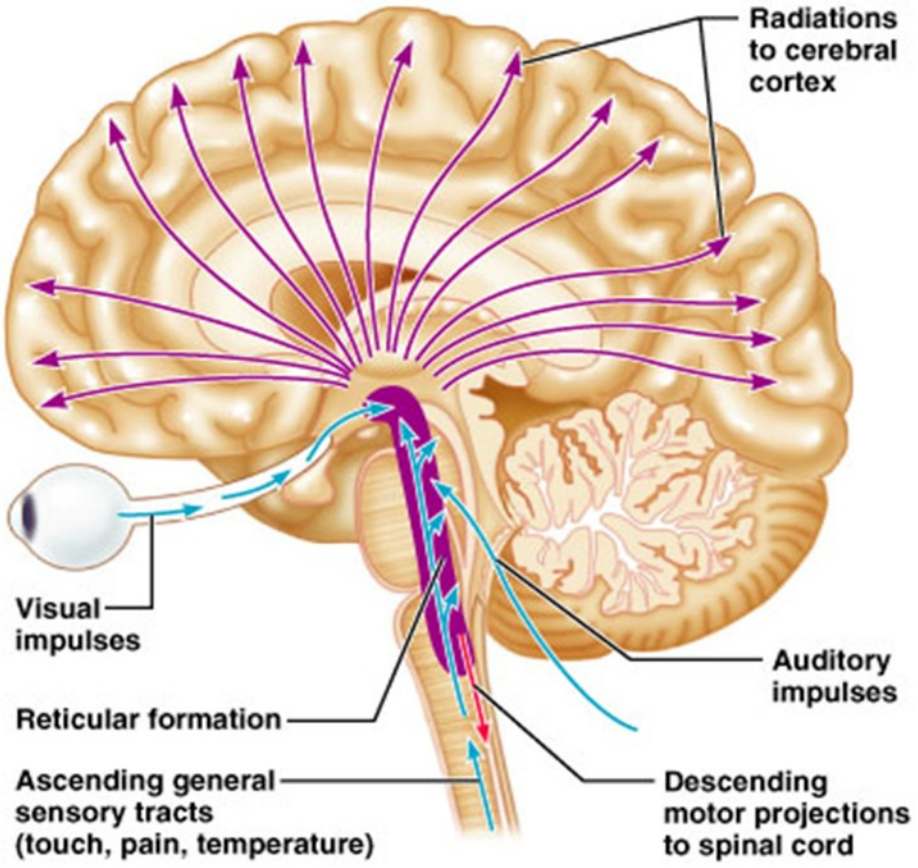
The Reticular System - widespread connections, ideal for arousal of the brain as a whole

Reticular activating system (RAS) -

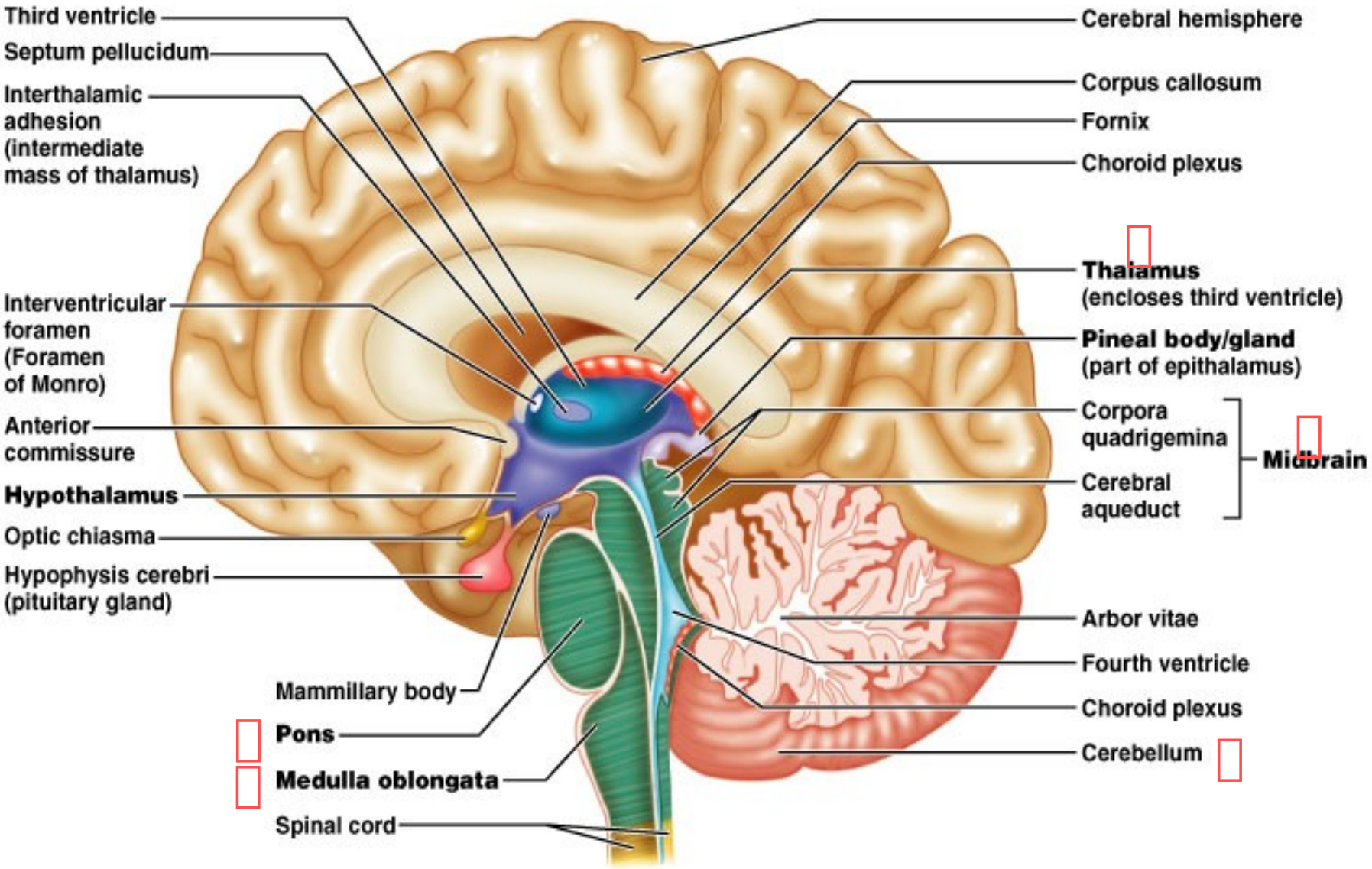
Maintains **consciousness** and **alertness**.

Functions in sleep ar arousal from sleep.

Pons and MO

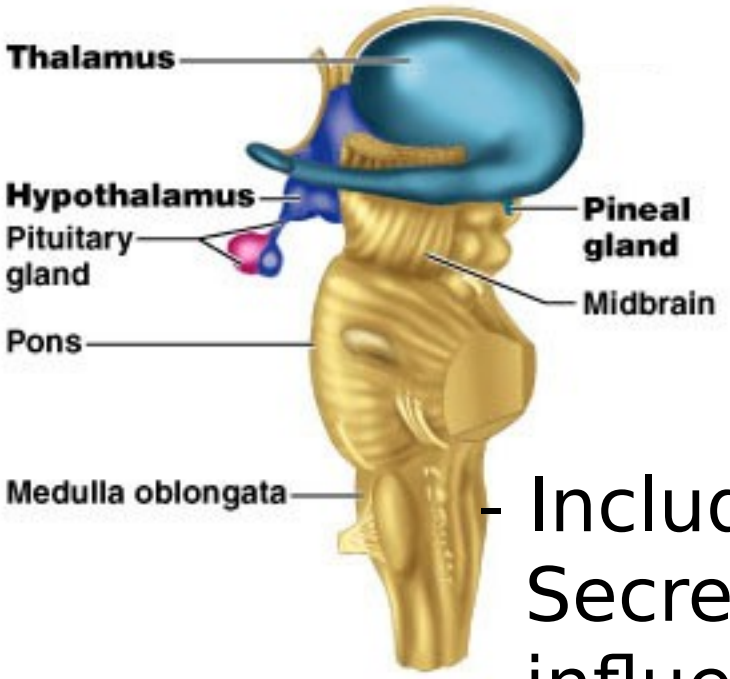


Regions below the Cerebrum



iencephalon

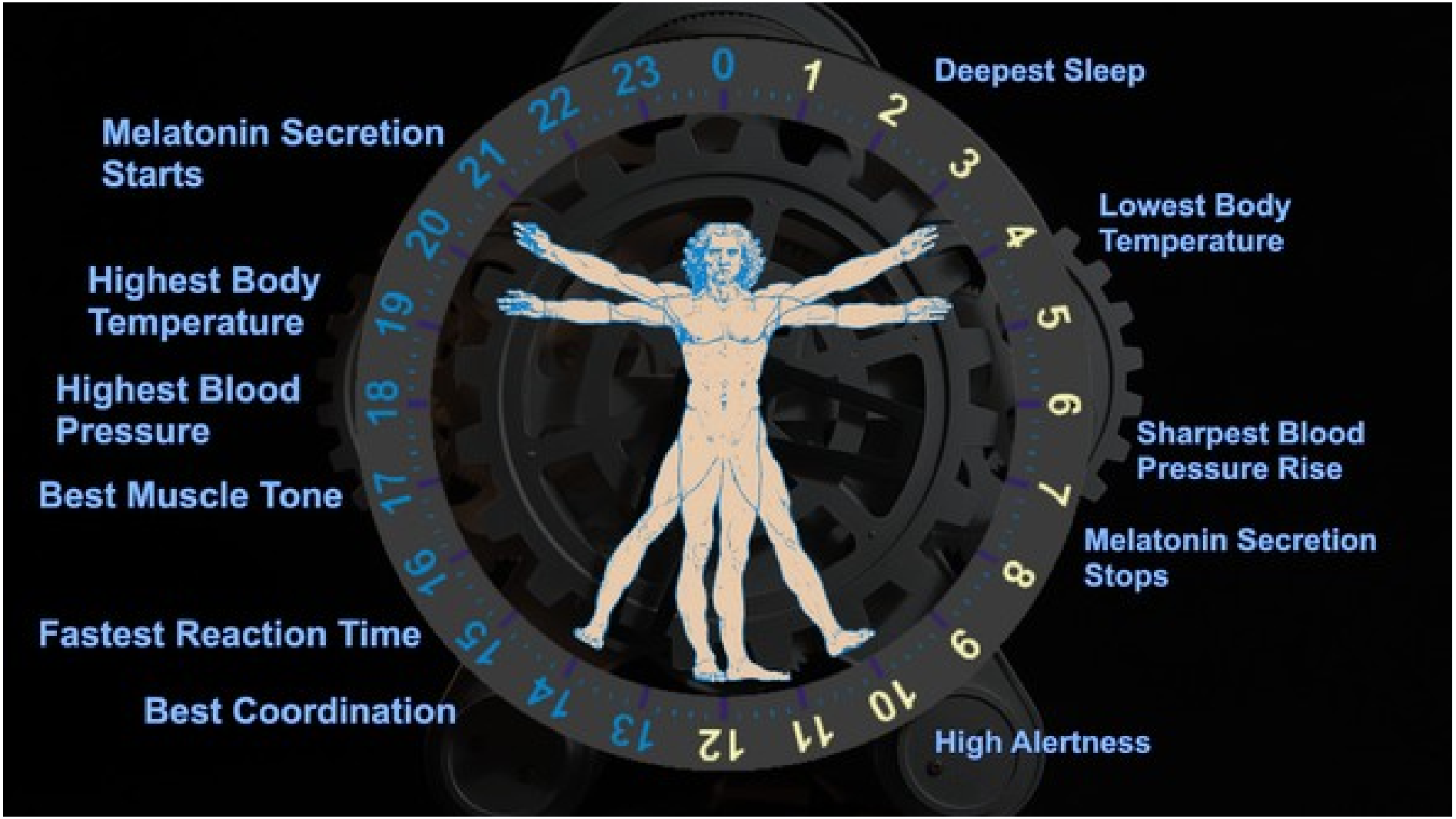
= 1) Epithalamus, 2) Thalamus and 3) Hypothalam



1) Epithalamus

- Includes the **pineal gland (body**
Secretes hormone melatonin, und
influence of the hypothalamus.

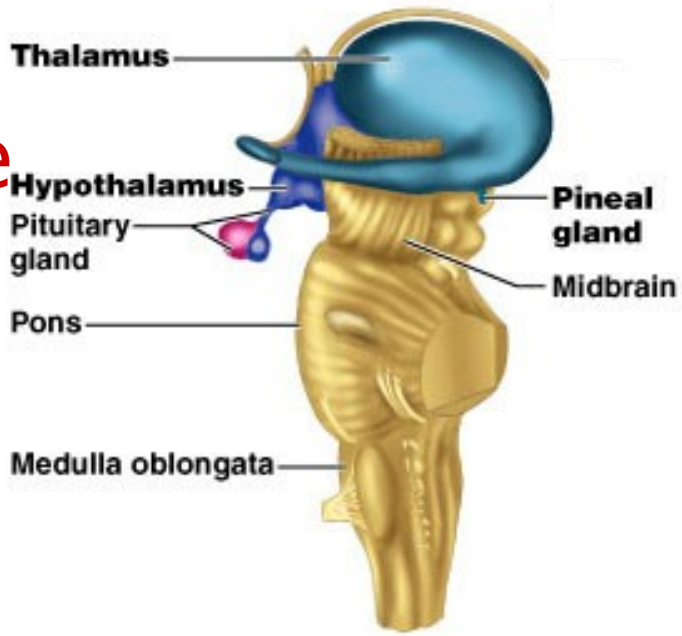
Dimethyl-tryptamine (DMT) is also released from Pineal glan

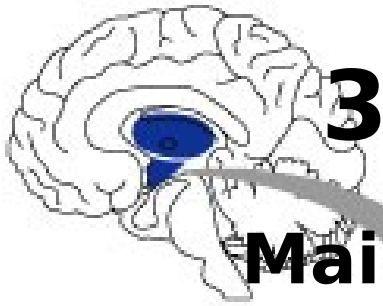

Melatonin Secretion Starts
Highest Body Temperature
Highest Blood Pressure
Best Muscle Tone
Fastest Reaction Time
Best Coordination
Deepest Sleep
Lowest Body Temperature
Sharpest Blood Pressure Rise
Melatonin Secretion Stops
High Alertness
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

Note: The significant **Blue Light** emitted from tv, computer and phone screens blocks the hormone **melatonin,** therefore suppresses your body's ability to prepare for sleep.

2) Thalamus

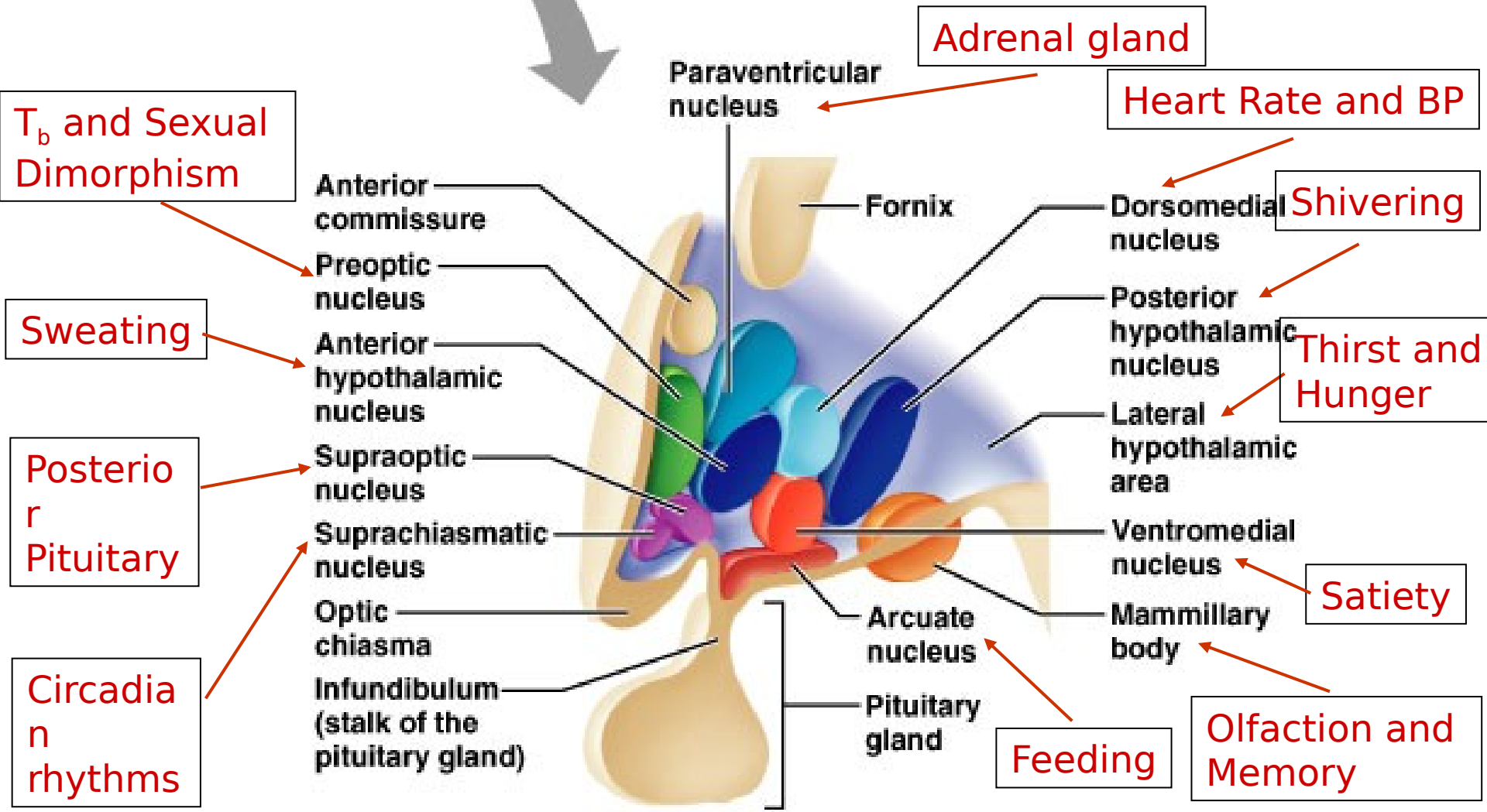
* Makes up 80% of the diencephalon.
* Contains ~ a dozen major nuclei which act as the "gateway" to cerebral cortex.
* Afferent impulses converge on thalamus.
* Nuclei organize and amplify or tone down signals.





3) Hypothalamus

Main visceral control center of the bo



Functions of the Hypothalamus:

1. Controls autonomic nervous system (ANS)
2. Control of the endocrine system

3. Regulation of body temperature (T_b)
4. Regulation of hunger and thirst sensations
5. Regulation of sleep-wake cycles

Overall: Controls much of behavior via emotional responses (Limbic) and ANS - Formation of memory